

**TECHNOLOGY INNOVATION AND THE PERFORMANCE OF ZENITH BANK PLC,  
GWAGWALADA, FCT-ABUJA**

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**ABSTRACT**

*Despite substantial efforts by monetary authorities to improve banking operations, Zenith Bank Plc in Abuja and other financial institutions in Nigeria still encounter various inefficiencies. This study focuses on “technology innovation and the performance of Zenith Bank in Abuja,” specifically examining how the adoption of mobile banking technology and the introduction of biometric authentication systems affect operational efficiency at Zenith Bank Plc. A descriptive research design was utilized, targeting a population of 470 employees from Zenith Bank Plc in Abuja. A sample size of 216 respondents was determined using the Taro Yamane statistical technique. Data were gathered through a structured questionnaire, with a simple random sampling technique employed for participant selection. The validity and reliability of the instrument were assessed using Cronbach’s alpha, resulting in an average score of 0.80. The collected data were analyzed through regression analysis using SPSS version 27.0 to test the proposed hypotheses. The findings indicated that the adoption of mobile banking technology and the implementation of biometric authentication systems significantly improve the operational efficiency of Zenith Bank in Abuja. The study recommends that Zenith Bank continue to invest in and enhance its mobile banking technology, ensuring that updates align with user needs and preferences.*

**Keywords:** *Technology, Innovation, Performance, Deposit Money Banks*

**INTRODUCTION**

Technological innovations have greatly impacted Nigeria's banking sector, particularly through electronic banking channels (Evian et al., 2021). These channels allow customers to conduct transactions flexibly across various times and locations, enhancing competitiveness, efficiency, and profitability. Information and Communication Technology (ICT) has a substantial role in the global economy, contributing over 18% to Nigeria's economy as of the second quarter of 2021. Both banks and other businesses continue adopting technological advancements to boost the quality of products

and services (Mawutor, 2014; Nworuh & Ahaiwe, 2003). According to Adewuyi (2011), banks strategically invest in new technologies to maintain a competitive edge. This expansion is seen in innovations such as app stores, POS terminals, ATMs, mobile banking, internet banking, mobile payments, and agency banking.

Technological innovation has significantly influenced the performance of all Nigerian banks, leading to substantial improvements in networking, service delivery, profitability, and customer responsiveness. These advancements have made payments easier and introduced convenient alternatives to cash and checks for

transactions, enabling seamless, internet-based 24-hour banking (Obasan, 2011). The connection between technological innovation and banking operations is evident in metrics like customer growth, transaction volume, efficiency, quality, and profitability (Ngugi & Karina, 2013). Technology also supports planning, scheduling, and service production, which are essential aspects of operational management (Khalil, 2012). However, research on the factors driving technological innovation adoption and banking operations at Zenith Bank in Abuja remains limited in the literature, unlike in other emerging economies.

Despite the efforts of monetary authorities to enhance banking operations, Zenith Bank Plc and other financial institutions in Nigeria still face numerous inefficiencies. These challenges include low operational efficiency, slow service delivery, customer dissatisfaction, prolonged transaction processing times, network interruptions, and frequent transaction errors. Such issues threaten the competitiveness of the financial services sector. Although technological innovations have been introduced to mitigate these problems, they have also added pressure to bank operations, especially in areas such as planning, scheduling, efficiency, effectiveness, quality, and staffing. Efficient operations are crucial for ensuring stability, sustainability, and progress towards financial inclusion in Nigeria.

Banks like Zenith Bank are vital for economic growth as they effectively transfer funds from surplus sectors to those in deficit, serving as essential financial pillars of the economy (Adegbe & Dada, 2018). Research by scholars such as Ssekiziyivu et al. (2017), Bananuka et al. (2018), Nalukenge et al. (2018), and Kabuye et al. (2019) has examined the relationship between technological innovation and banking performance in various countries. However, there is a significant research gap regarding this relationship in the Nigerian context, particularly concerning Zenith Bank. Nigerian deposit money banks encounter specific challenges, including insufficient deposits to meet service demands, governance and process control issues, risk management difficulties, compliance challenges, financial reporting problems, and

fraud audits, all of which require urgent attention.

Although some studies have investigated the effects of individual technological innovations on banking performance, comprehensive research on the combined impact of innovations like mobile banking and biometric authentication systems on operational efficiency in Nigerian banks is lacking. Zenith Bank in Abuja, in particular, faces unique challenges related to regulatory restrictions, infrastructure constraints, and cybersecurity risks, all of which impact the adoption and efficacy of technological innovations. Therefore, it is crucial to undertake research to understand the complex interactions between these innovations and performance outcomes. Such insights could guide strategic decision-making, policy development, and best practices in the industry, ultimately improving the overall performance of Zenith Bank and the Nigerian banking sector.

### **Research Questions**

Based on the aforementioned problems, the following research questions serve as a guide to the study:

- i. To what extent does the adoption of mobile banking technology affect the operational efficiency of Zenith bank in Abuja?
- ii. To what degree does the introduction of biometric authentication systems influence operational efficiency of Zenith bank in Abuja?

### **Objectives of the Study**

The main objective of the study is to examine technology innovation and the performance of Zenith bank in Abuja. Specific objectives of the study are to:

- i. Determine the extent to which the adoption of mobile banking technology affects the operational efficiency of Zenith bank in Abuja.
- ii. Investigate the degree to which the introduction of biometric authentication

systems influences operational efficiency of Zenith bank in Abuja.

### **Statement of Hypotheses**

The following null hypotheses was postulated to guide the study further in this investigation:

**H<sub>01</sub>:** The adoption of mobile banking technology does not significantly affect the operational efficiency of Zenith bank in Abuja.

**H<sub>02</sub>:** The introduction of biometric authentication systems does not significantly influence operational efficiency of Zenith bank in Abuja.

## **LITERATURE REVIEW**

### **Conceptual Review**

#### **Concept of Technological Innovation**

The term "innovation" originates from the Latin word meaning "to introduce something new within the existing realm and order of things" (Adegbite, 2010). Innovation can be understood as an idea, practice, or object perceived as new by an individual or group (Rogers, 2003). The European Union (2005) defines technological innovation as the implementation of new or significantly improved products and processes, encompassing various scientific, technological, organizational, financial, and commercial activities. Technological innovation is considered implemented when a product innovation is introduced to the market or a process innovation is utilized in production. A firm is deemed technologically innovative if it has introduced either new or substantially improved products or processes (Szymanski & Ropetto, 2000; Adegbite, 2010).

Cumming (2008) defines technological innovation as the systems, processes, and equipment utilized by organizations to facilitate smooth operational activities. Drucker (2013) argued that innovations provide organizations with strategic methods to tackle challenges and achieve a sustainable competitive edge. According to Davila (2010), innovation is about

acting on creative ideas to make a meaningful and measurable impact in the relevant field. Recent developments have harnessed information technology to produce new or significantly improved products and processes (OECD, 2005). Other goals of innovation include enhancing human capital development (Obeng & Mkhize, 2017), boosting operational efficiency and service quality (Parasuraman, 2010), and fulfilling customer expectations (Chen, 2005). In contemporary service organizations, innovation is considered a core competency. Damanpour (2010) and the OECD (2005) categorize technological innovations into two types: process innovations and product innovations. Product innovations aim to create new or significantly enhanced products to improve customer service and explore new market opportunities (Damanpour, 2010).

### **Mobile Banking Technology**

Mansfield (2018) emphasizes that mobile banking technology has become a transformative force within the banking sector, fundamentally changing how customers engage with financial institutions and manage transactions. Lim et al. (2019) describe mobile banking technology as driven by the rise of smartphones alongside advancements in telecommunications and digital infrastructure, which have enabled the global adoption of mobile banking solutions. According to Gopalakrishnan and Kasthuri (2020), mobile banking technology originated in the early 2000s, initially offering simple services like balance inquiries and transaction alerts through SMS or Interactive Voice Response (IVR) systems (Mansfield, 2018). With the advent of smartphones and mobile internet access, however, the field evolved significantly, supporting the creation of more advanced mobile banking applications with expanded features and capabilities.

### **Biometric Authentication Systems**

Khan et al. (2018) describes biometric authentication systems as an effective tool within the banking sector to enhance security, reduce fraud, and improve the customer experience. With the expansion of digital banking channels and the rise in sophisticated

cyber threats, traditional authentication methods like passwords and PINs have become increasingly vulnerable to breaches and unauthorized access. Li et al. (2020) defines biometric authentication as a secure and convenient alternative that uses individuals' unique physiological or behavioral traits—such as fingerprints, iris patterns, facial features, and voiceprints—for identity verification. The use of biometric authentication in banking began in the early 2000s when banks started testing fingerprint recognition technology to secure ATM and online banking access (Khan et al., 2018). The adoption of biometrics accelerated as sensor technology, algorithms, and regulatory support advanced.

### **Concept of Performance**

Organizational performance serves as a key indicator of an organization's effectiveness. March and Sutton (2017) describe performance through multiple metrics, including effectiveness, efficiency, financial sustainability, and relevance to stakeholders. While various studies have used a broad spectrum of performance indicators, a recent survey of managers highlighted sales growth as the most frequently cited measure of overall organizational success. The diversity of these factors raises questions about whether organizational goals can be represented as unified or if they inherently contain conflicting objectives (March & Sutton, 2017). Richard (2009) suggests that when performance measures fail to account for an organization's diverse constituencies, it may view meeting the needs of certain stakeholders as problematic rather than sustaining a constructive balance among them. This reflects an organization's capacity to meet delivery or performance standards. Product performance can be measured by product availability and deliverability, and due to domestic and international competition, companies now strive to enhance production methods (Krajewski & Ritzman, 2007).

### **Operational Efficiency**

Operational efficiency is an essential concept in business management that refers to an organization's capacity to optimize its processes,

resources, and activities to achieve the highest possible output with the least input (Adeleke et al., 2019). It is crucial for driving profitability, improving customer satisfaction, and maintaining competitiveness within the financial sector. Operational efficiency includes various elements of organizational performance, such as resource utilization, workflow management, cost control, and productivity improvement. By maintaining efficient operations, Deposit Money Banks (DMBs) can minimize waste, eliminate redundancy, and streamline processes to effectively deliver products and services while maximizing value for stakeholders. Common key performance indicators (KPIs) used to evaluate operational efficiency in DMBs include the cost-to-income ratio, operating expenses-to-assets ratio, and productivity metrics (Adeleke et al., 2019). These metrics offer valuable insights into a bank's ability to allocate resources effectively, manage expenses, and enhance operational processes.

### **Theoretical Framework**

The Technology Acceptance Model (TAM) proposed by Venkatesh and Davis (2000) serves as the most appropriate theoretical framework for this study, as it effectively explains and predicts how individuals accept and adopt new technologies. TAM provides valuable insights into customers' perceptions, attitudes, and intentions regarding the adoption of digital banking technologies, including mobile banking applications and biometric authentication systems. Its extensive application across different industries further supports its relevance as a theoretical framework for this research. By identifying the factors that influence customer acceptance behavior, Deposit Money Banks (DMBs) can formulate targeted strategies to improve customer satisfaction and engagement.

### **Empirical Review**

Enoruwa et al. (2023) investigated the impact of technological innovations on bank performance in West Africa, addressing the ambiguity surrounding this effect in the region. Their study utilized an annual time series dataset from 1997 to 2020, applying multiple regression analyses including ARDL, FMOLS, and DOLS models,

with data sourced from secondary materials. The results revealed both positive and negative long-term relationships between technological innovation and bank performance. The authors concluded that enhancing the quality of technological tools and investing in cybersecurity could improve bank performance. However, a limitation of the study is the lack of clarity regarding the population and sample size, which affects the generalizability of the results.

Adiga et al. (2022) explored the relationship between financial technology and banking sector performance in Nigeria, addressing the inconclusive effects of financial technology on various performance indicators. Although the research design was not clearly outlined, secondary data from the CBN Statistical Bulletin and NDIC reports were utilized. The ARDL technique was employed for data analysis, revealing that financial technology significantly impacted ROA, ROE, and non-interest income, but not interest income. The authors concluded that the overall effect of financial technology on banking sector performance remains unclear, with limitations stemming from insufficient information on research design, population, and sample size, which affects the methodological rigor.

Salami et al. (2022) examined the factors influencing the adoption of technological innovations and their effects on banking operations in Lagos, Nigeria. The study focused on the impact of these innovations on banking operations, employing a survey research design with a target population of employees from selected deposit money banks in Lagos State. A sample size of 397 was chosen using simple random sampling, with data collected through questionnaires and analyzed via simple regression analysis. The findings indicated significant effects of technological innovations on banking operations. While the methodology and sample size were clearly defined, the exclusive focus on banks in Lagos State may limit the generalizability of the findings.

Daniels and Emmanuel (2022) studied how techniques for managing technological innovation influence organizational performance

in Nigerian deposit money banks. They aimed to understand the impact of innovation management on performance, using descriptive survey research methods. The population included employees from First Bank, Access Bank, and Zenith Bank in Delta State, with a sample size of 277 determined using the Taro Yamani formula. Although the data collection method was not clearly articulated, the study concluded that banks should focus on creating convenient transaction methods and recommended conducting market research to enhance product innovation strategies. A limitation noted was the lack of specific details regarding data collection and analysis methods.

Khalid et al. (2021) studied the impact of electronic banking on bank performance in Pakistan. The problem was the effect of electronic banking channels on bank performance. The study used quarterly data from 2011 to 2018, applying Johansen cointegration and VECM models. Data was collected from secondary sources. Findings revealed a positive and significant short-run association between various electronic banking channels and bank profitability. The study's strength lies in its sophisticated statistical techniques, but it lacks clarity on the population and sample size.

### **Study Gap**

Several studies (Enoruwa et al., 2023; Adiga et al., 2022; Okologume & Musa, 2021) reported mixed findings on the impact of specific technologies like ATMs, POS, mobile banking, and internet banking on DMB performance. Some studies (Enoruwa et al., 2023) explore the long-term relationship between technological innovation and DMB performance, while others (Salami et al., 2022) focused on short-term effects. This current study however, explores both to provide a more comprehensive picture of how technological innovation impacts DMBs over time.

In addition, studies utilized ROA and ROE as performance indicators (Enoruwa et al., 2023; Adiga et al., 2022). This study however considered incorporating a wider range of performance measures, such as operational efficiency to provide a more nuanced



understanding of how technological innovation impacts DMBs. This study also differs from previous studies as it examines three measures of technological innovation such as adoption of mobile banking technology and introduction of biometric authentication systems which were not covered in previous studies. By addressing these potential gaps, this study offers a more comprehensive and nuanced understanding of the relationship between technological innovation and the performance of DMBs in the Nigerian context.

## METHODOLOGY

The study required a structured questionnaire to collect necessary data and adopted a descriptive survey research design due to its effectiveness in characterizing large populations and its capacity to yield substantial, targeted results. This approach facilitated anonymity, encouraging candid responses as participants were assured of confidentiality. Targeting employees across various Zenith Bank Plc. branches in Abuja, the study's population totaled 470 individuals, spanning top, middle, and lower cadre positions. Using Taro Yamane's formula with a 5%

sampling error, a sample size of 217 was calculated and marked up by 10%, yielding 238 questionnaires distributed proportionately across branches to reflect population diversity. A structured, close-ended questionnaire based on a five-point Likert scale (ranging from Strongly Agree to Strongly Disagree) gathered demographic data and explored the relationship between technological innovations and Zenith Bank's performance. Questionnaires were distributed by research assistants, employing both in-person submissions and pre-paid return envelopes, with completed forms carefully reviewed for accuracy. Data analysis utilized both descriptive and inferential statistics; simple percentages and tables summarized findings, while multiple regression analysis, facilitated by SPSS, quantified relationships between variables. The regression model included operational efficiency (OE) as the dependent variable and mobile banking technology (MBT) and biometric authentication systems (BAS) as independent variables. Instrument validity was ensured through expert review, while reliability, assessed via test-retest and Cronbach's alpha ( $\alpha = 0.80$ ), confirmed internal consistency, establishing the tool's dependability and appropriateness for this study.

## RESULTS AND FINDINGS

### Response Rate

Questionnaire Distributed	No	Percentage
Returned Questionnaire	220	92%
Unreturned Questionnaire	18	8%
<b>Total</b>	<b>238</b>	<b>100%</b>

Source: Field Survey, (2024)

In distributing 238 questionnaires, 220 were returned, yielding a return rate of 92%. Conversely, 18 questionnaires were not returned, resulting in a 8% non-return rate. This data highlights a significant level of engagement with the survey, evidenced by the majority of recipients responding.

### Testing of Hypothesis One

**H<sub>01</sub>:** The adoption of mobile banking technology does not have significant effect on operational efficiency of Zenith Banks in Abuja.

#### Model one

$$OE = \alpha + \beta_1(MBT) + \beta_2(BAS) + \epsilon \dots \dots \dots 1$$

**Table 1 Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.966 <sup>a</sup>	.932	.931	.13311

a. Predictors: (Constant), ACM, IBAS

*Source: Generated using SPSS Output Version 27.0.1*

Table 1 displays the model summary for the regression analysis. The R value of .966 indicates a strong correlation between the predictors (ACM, IBAS) and the dependent variable. The R Square value of .932 implies that roughly 93.2% of the variance in the dependent variable is accounted for by the model. The Adjusted R Square value of .931, which closely matches the R Square, suggests

that the model is appropriately adjusted for the number of predictors used. The standard error of the estimate, .13311, represents the average deviation of the observed values from the regression line. Based on the decision rule, the high R Square and Adjusted R Square values, combined with the low standard error, indicate that the model is very effective and fits the data well.

**Table 2 ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.707	2	17.569	991.623	.000 <sup>b</sup>
	Residual	3.827	218	.018		
	Total	56.534	220			

a. Dependent Variable: OE

b. Predictors: (Constant), ACM, IBAS, AMBT

*Source: Generated using SPSS Output Version 27.0.1*

Table 2 presents the ANOVA results for the regression model. The regression model's Sum of Squares is 52.707, with 3 degrees of freedom (df), resulting in a Mean Square of 17.569. The Residual Sum of Squares is 3.827, with 218 degrees of freedom, leading to a Mean Square of .018. The F-statistic is 991.623, with a significance level (Sig.) of .000. According to

the decision rule, if the p-value (Sig.) is less than 0.05, the model is statistically significant. Since the p-value is .000, which is well below 0.05, the model is statistically significant, indicating that the predictors (ACM, IBAS) have a significant effect on the dependent variable (OE).

**Table 3 Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.110	.073		1.498	.136
	AMBT	.126	.028	.132	4.545	.000
	IBAS	.108	.025	.126	4.353	.000

a. Dependent Variable: OE

*Source: Generated using SPSS Output Version 27.0.1*

Table 3 displays the coefficients of the regression model, providing insight into the

contribution of each predictor to the dependent variable (OE). The constant (intercept) has an

unstandardized coefficient (B) of .110 with a t-value of 1.498 and a p-value (Sig.) of .136, which is not statistically significant ( $p > 0.05$ ). Among the predictors, AMBT has a B value of .126, with a t-value of 4.545 and a p-value of .000, indicating a significant positive effect. Similarly, IBAS has a B value of .108, a t-value of 4.353, and a p-value of .000, showing a significant positive influence. According to the decision rule, since all predictors Having p-values lower than 0.05 indicates that they are statistically significant, which means that AMBT and IBAS have a significant impact on the dependent variable (OE).

The study revealed several key findings regarding the impact of technological innovations on operational efficiency at Zenith Bank in Abuja:

**Mobile Banking Technology:** The adoption of mobile banking technology significantly enhances the operational efficiency of Zenith Bank. This integration streamlines processes, reduces operational costs, and improves overall service delivery. This finding is consistent with previous research indicating that technological innovations can have both positive and negative effects on bank performance.

**Biometric Authentication Systems:** The introduction of biometric authentication systems notably influences operational efficiency. Implementing these systems improves security, streamlines identity verification processes, and enhances overall operational effectiveness. The positive impact of biometric systems supports existing literature showing the benefits of various technological innovations on bank performance.

### **Discussion of Findings**

The study revealed that adopting mobile banking technology significantly enhances the operational efficiency of Zenith Bank in Abuja. This indicates that integrating mobile banking solutions can streamline processes, reduce operational costs, and improve overall service delivery. This finding is consistent with the research of Enoruwa, Onwumere, Ibunor, Ehigie, and Ezuem (2023), Zu et al. (2019), Le

and Ngo (2020), and Adiga, Adigwe, Okonkwo, and Ogbonna (2022), which demonstrate both positive and negative long-term relationships between technological innovation and bank performance in West Africa. These studies, grounded in the Technology Acceptance Model (TAM) and supported by data from the Central Bank of Nigeria (CBN) and Nigeria Deposit Insurance Corporation (NDIC), used the Auto Regressive Distributed Lag (ARDL) technique to analyze the impact of various payment systems on bank profitability. The results indicate that bank profitability can be enhanced through increased use of bank cards, ATMs, and POS terminals, with a strong correlation to return on assets (ROA) and return on equity (ROE). Theoretically, this aligns with the TAM, suggesting that successful technology adoption positively influences bank profitability by improving operational efficiency, customer satisfaction, and overall financial performance.

Additionally, the study found that the introduction of biometric authentication systems significantly influences the operational efficiency of Zenith Bank in Nigeria. This suggests that implementing biometric systems can improve security, streamline processes, and enhance overall operational effectiveness. This finding supports the work of Ibekwe (2021), Bingilar and Bariweni (2019), Ibeta and Anyanwu (2017), and Dabor, Ezie, and Anyatonwu (2017), which showed that various technological innovations, including ATMs and POS systems, positively impact bank performance, while internet banking had an adverse effect on return on assets. These studies reveal a significant positive association between ATM transactions and bank assets, highlighting the benefits of biometric systems. Theoretically, this is in line with the Resource-Based View (RBV) theory, which suggests that leveraging valuable resources, such as enhanced security measures, can provide competitive advantages and optimize operational processes.

### **CONCLUSION AND RECOMMENDATIONS**

This study concludes that adopting mobile banking technology significantly enhances the



operational efficiency of Zenith Bank in Abuja. This indicates that integrating mobile banking solutions can streamline processes, reduce operational costs, and improve overall service delivery. The study concluded that the introduction of biometric authentication systems significantly influences the operational efficiency of Zenith Bank in Nigeria. This suggests that implementing biometric systems can improve security, streamline processes, and enhance overall operational effectiveness. Based on the study's findings,

- i. It is recommended that Zenith Bank in Abuja should continue to invest in and expand its mobile banking technology. This investment should include updating and enhancing mobile banking platforms to ensure they meet user needs and preferences.
- i. Zenith Bank should ensure the seamless integration of biometric authentication systems across all channels, including in-branch services, online banking platforms, and mobile applications. This comprehensive approach will maximize the efficiency gains and provide a consistent user experience for customers.

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